CLAIMS

1. An image-processing apparatus for quantizing multi-level (M-level) image data into N values, where M>N>1, using a multi-level error-diffusion process or a minimum-average multi-level error method, comprising:

means for outputting correction data in which an error diffused from already-quantized pixels therearound is added to the multi-level image data of a pixel in question;

means for setting a quantization-threshold value based on the multi-level image data of the pixel in question;

means for comparing the correction data and the quantization-threshold value so as to output N-level image data;

and means for calculating an error generated when generating the N-level image data;

wherein, assuming quantized values are 0, 1, 2, …, N-1, and tones of the quantized values are V0, V1, V2, …, VN-1, respectively at least one threshold value Th_{a+1} in an interval between V_a and V_{a+1} (where $0 \leq a < N-1$) of at least one input value, when an input tone value is ν, is set based on equation (1), where the equation (1) is:

$$Th_{a+1}=(\sqrt{\ }((\nu-V_a)(V_{a+1}-V_a)/2)))+V_a. \quad (1)$$

2. The image-processing apparatus as claimed in

Claim 1, wherein the threshold value is set based on said equation (1) only when, in the input value interval between V_a and V_{a+1} (where $0 \leq a < N-1$), the input value ν is greater than a constant K_a (where $V_a < K_a < V_{a+1}$).

3. The image-processing apparatus as claimed in Claim 1, wherein the threshold value is obtained through a sequential process depending on the input value ν.

4. The image-processing apparatus as claimed in Claim 2, wherein the threshold value is obtained through a sequential process depending on the input value ν.

5. The image-processing apparatus as claimed in Claim 1, wherein the threshold value is obtained from a look-up table depending on the input value ν.

6. The image-processing apparatus as claimed in Claim 2, wherein the threshold value is obtained from a look-up table depending on the input value ν.

7. An image-forming apparatus for quantizing input multi-level (M-level) image data into N values, where $M > N > 1$, using a multi-level error-diffusion process or a minimum-average multi-level error method and forming an image

using dots which correspond to each of the N values, comprising:

means for outputting correction data in which an error diffused from already-quantized pixels therearound is added to the multi-level image data of a pixel in question;

means for setting a quantization-threshold value based on the multi-level image data of the pixel in question;

means for comparing the correction data and the quantization-threshold value so as to output N-level image data;

and means for calculating an error generated when generating the N-level image data;

wherein, assuming quantized values are 0, 1, 2, …, N-1, and tones of the quantized values are V0, V1, V2, …, VN-1, respectively at least one threshold value Th_{a+1} in an interval between V_a and V_{a+1} (where $0 \leq a < N-1$) of at least one input value, when an input tone value is ν, is set based on equation (1), where the equation (1) is:

$$Th_{a+1} = (\sqrt{\ } ((\nu - V_a)(V_{a+1} - V_a)/2)) + V_a.$$

8. The image-forming apparatus as claimed in Claim 7, wherein the threshold value is set based on said equation (1) only when, in the input value interval between V_a and V_{a+1} (where $0 \leq a < N-1$), the input value ν is greater than a constant K_a (where $V_a < K_a < V_{a+1}$).

9. The image-forming apparatus as claimed in Claim 7, wherein the threshold value is obtained through a sequential process depending on the input value ν.

10. The image-forming apparatus as claimed in Claim 8, wherein the threshold value is obtained through a sequential process depending on the input value ν.

11. The image-forming apparatus as claimed in Claim 7, wherein the threshold value is obtained from a look-up table depending on the input value ν.

12. The image-forming apparatus as claimed in Claim 8, wherein the threshold value is obtained from a look-up table depending on the input value ν.

13. The image-forming apparatus as claimed in Claim 7, wherein the image is formed with one of an electrophotographic method, an ink-jet method, and a thermal transfer method.

14. The image-forming apparatus as claimed in Claim 8, wherein the image is formed with one of an electrophotographic method, an ink-jet method, and a thermal

transfer method.

15. The image-forming apparatus as claimed in Claim 9, wherein the image is formed with one of an electrophotographic method, an ink-jet method, and a thermal transfer method.

16. The image-forming apparatus as claimed in Claim 10, wherein the image is formed with one of an electrophotographic method, an ink-jet method, and a thermal transfer method.

17. The image-forming apparatus as claimed in Claim 11, wherein the image is formed with one of an electrophotographic method, an ink-jet method, and a thermal transfer method.

18. The image-forming apparatus as claimed in Claim 12, wherein the image is formed with one of an electrophotographic method, an ink-jet method, and a thermal transfer method.

19. A program for causing a computer to execute a process of quantizing multi-level (M-level) image data into N values, where M>N>1, using a multi-level error-diffusion

process or a minimum-average multi-level error method, comprising:

a code for a step of outputting correction data in which an error diffused from already-quantized pixels therearound is added to the multi-level image data of a pixel in question;

a code for a step of setting a quantization-threshold value based on the multi-level image data of the pixel in question;

a code for a step of comparing the correction data and the quantization-threshold value so as to output N-level image data;

and a code for a step of calculating an error generated when generating the N-level image data,

wherein, assuming quantized values are 0, 1, 2, …, N-1, and tones of the quantized values are V0, V1, V2, …, VN-1, respectively at least one threshold value Th_{a+1} in an interval between V_a and V_{a+1} (where $0 \leq a < N-1$) of at least one input value, when an input tone value is set to be ν, is set based on equation (1), where the equation (1) is:

$$Th_{a+1}=(\sqrt{\ }((\nu-V_a)(V_{a+1}-V_a)/2)))+V_a.$$

20. The program as claimed in Claim 19, wherein the threshold value is set based on said equation (1) only when, in the input value interval between V_a and V_{a+1} (where

$0 \leq a<N-1)$, the input value ν is greater than a constant K_a (where $V_a<K_a<V_{a+1}$).